

The Building Blocks of Effective Visualizations

Alison Khan
May 24, 2017

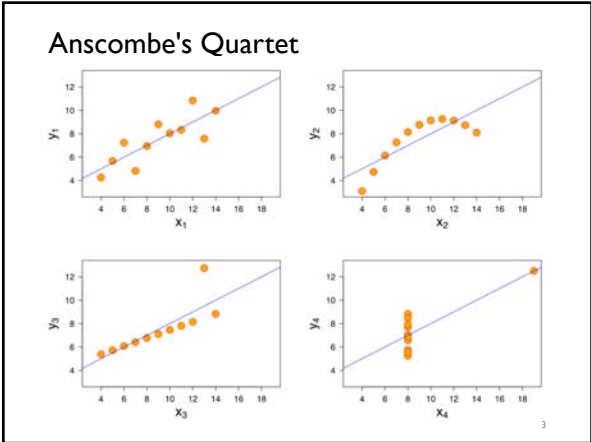
Set 1		Set 2		Set 3		Set 4	
x	y	x	y	x	y	x	y
10	8.04	10	9.14	10	7.46	8	6.58
8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.10	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.10	4	5.39	19	12.50
12	10.84	12	9.13	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

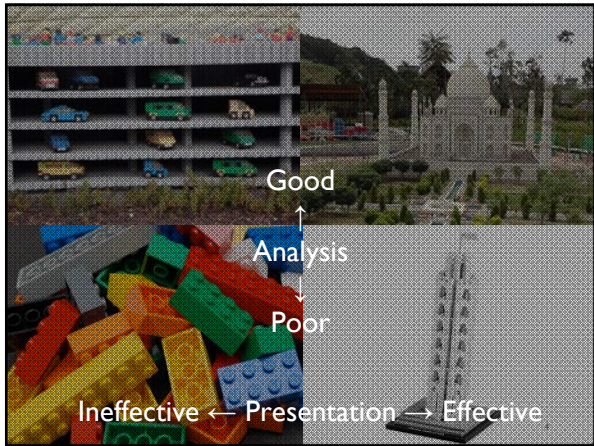
Mean of X:	9.00
Variance of X:	11.00

Mean of Y:	7.50
Variance of Y:	4.127 or 4.122

Correlation:	0.816
Regression Line:	$y = 3.000 + 0.500x$


2





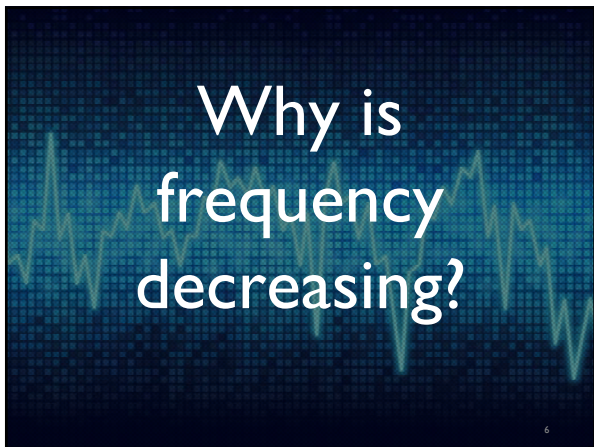
Building Blocks

- Choosing the right chart
- Making your charts better
- Using charts instead of tables
- Using tables instead of charts
- Making your tables better
- Using Color effectively

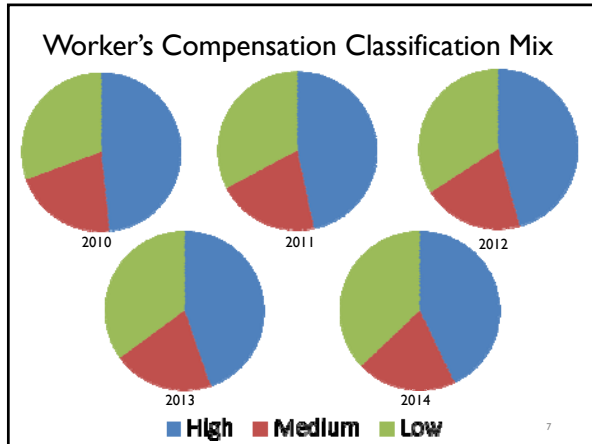


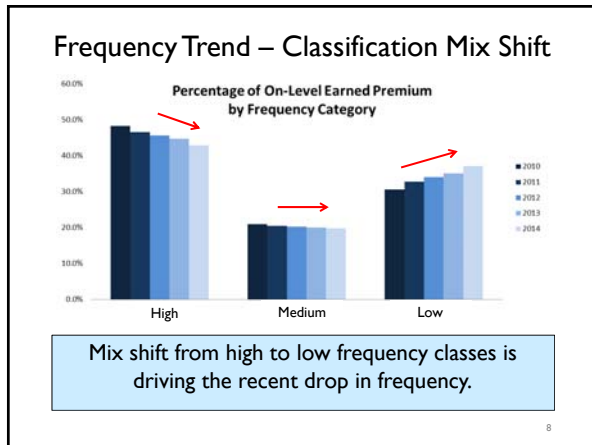
5

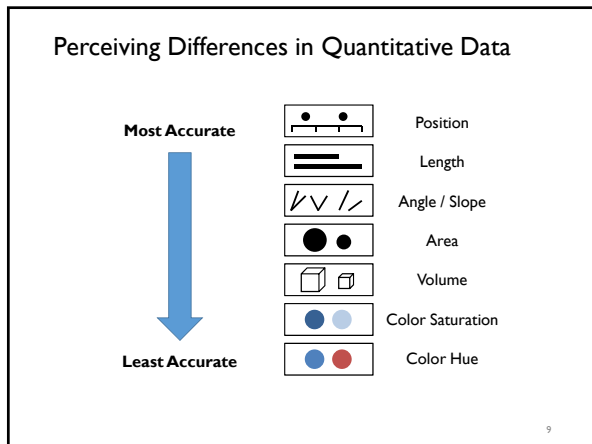
Why is frequency decreasing?



6

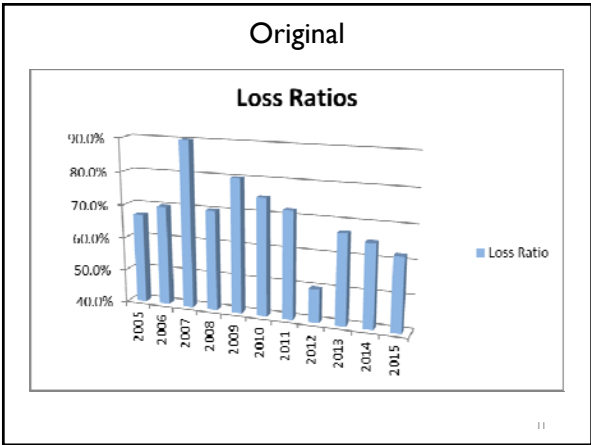







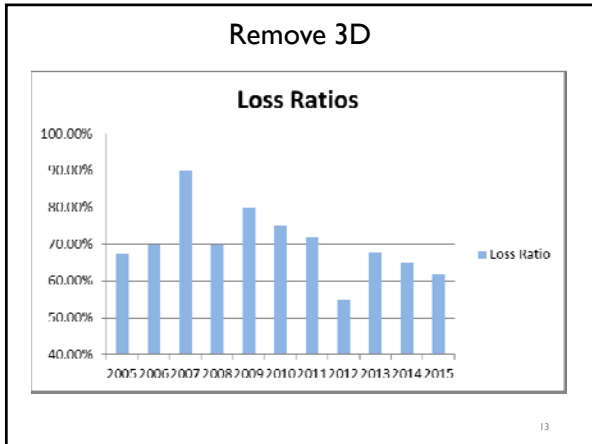
How has the business performed over time?

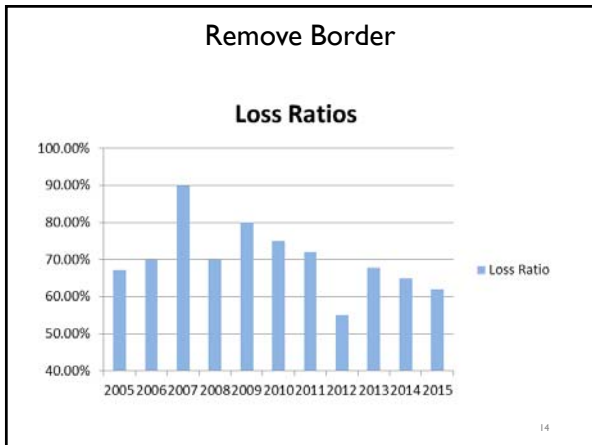


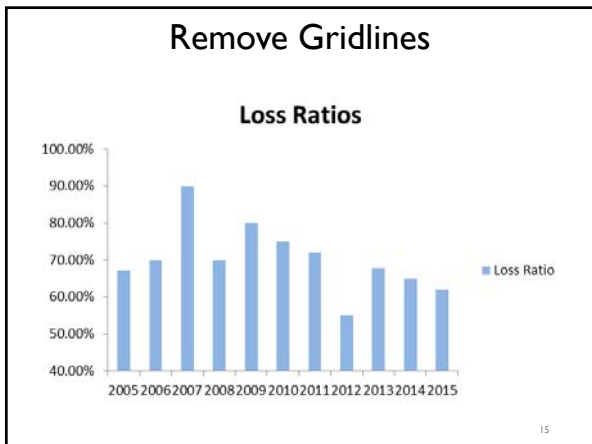


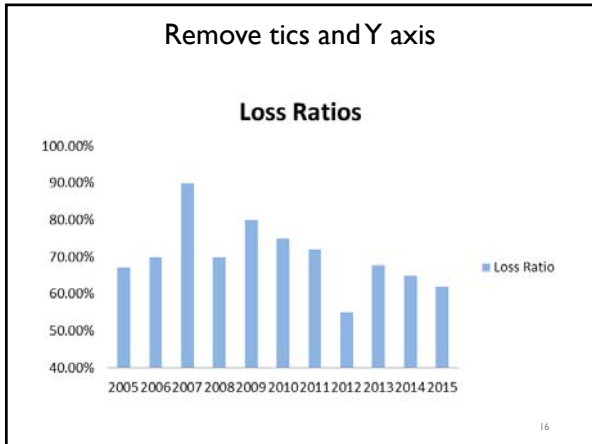
Maximize the data-ink ratio

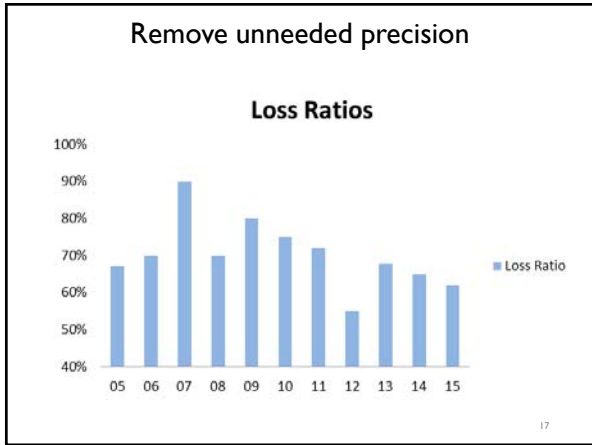
$$\text{Data - ink ratio} = \frac{\text{data - ink}}{\text{total ink used to print the graphic}}$$


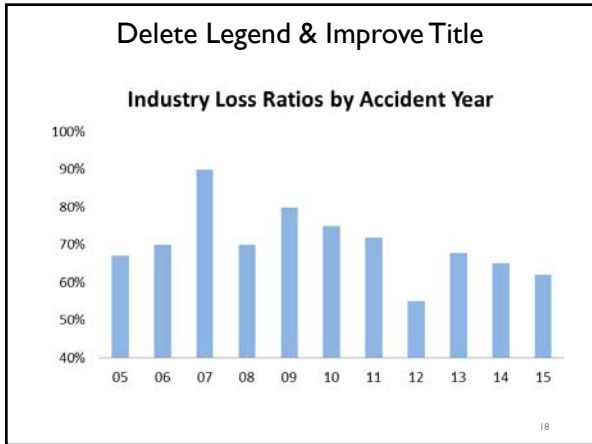


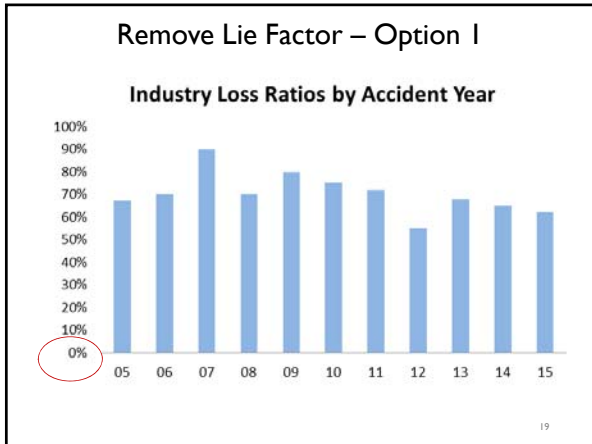


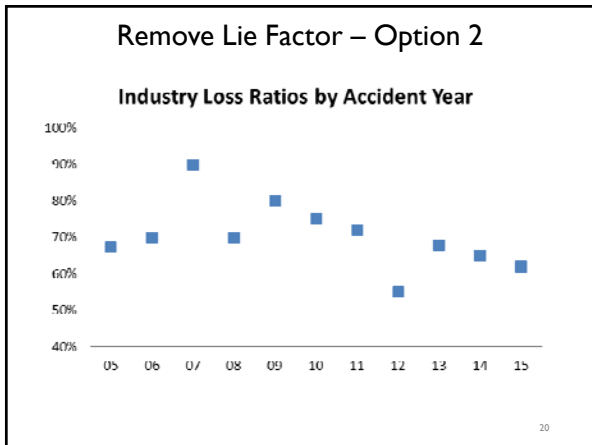


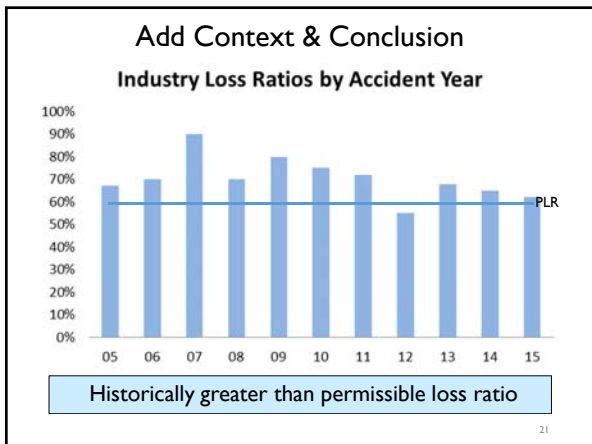


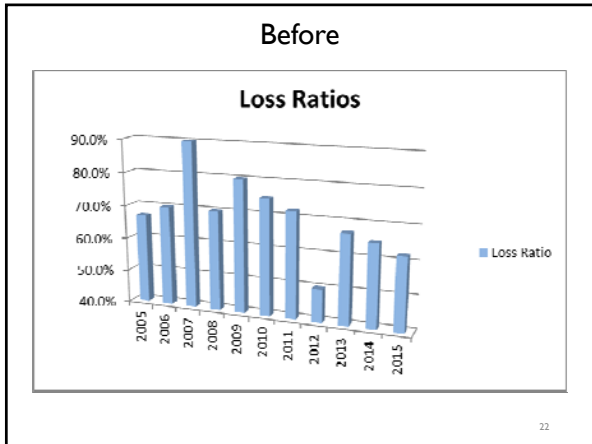


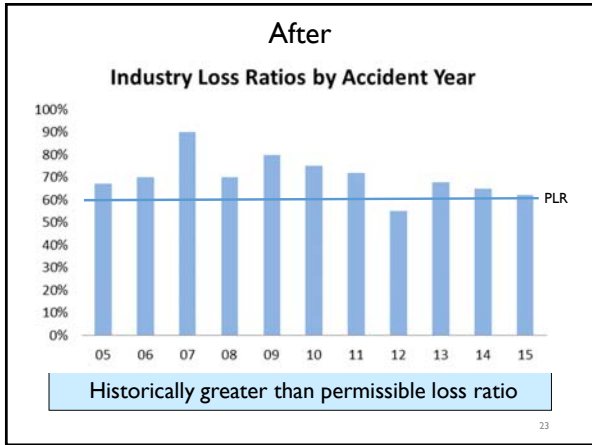














Change in Indication by Region

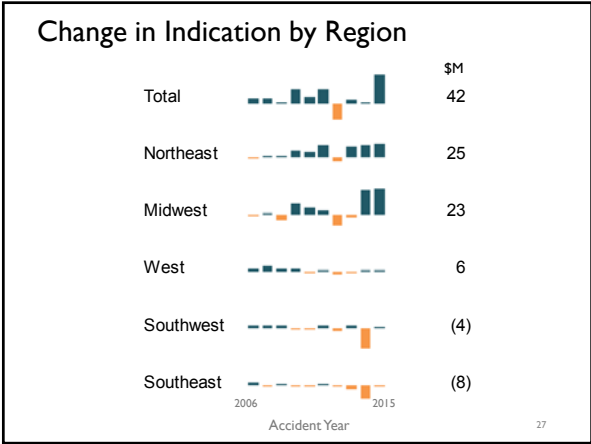
	West	Southwest	Midwest	Northeast	Southeast	Total
2006	1,493	1,346	(3)	(335)	1,214	3,715
2007	2,672	1,366	85	143	(786)	3,480
2008	1,049	1,065	(2,386)	727	586	1,042
2009	1,101	(6)	4,463	3,215	(93)	8,680
2010	(296)	(332)	2,963	2,211	(419)	4,127
2011	585	1,436	1,768	5,078	318	9,186
2012	(905)	(1,052)	(4,880)	(1,751)	(665)	(9,252)
2013	(149)	973	(1,169)	4,595	(1,597)	2,653
2014	41	(8,802)	10,676	5,251	(6,053)	1,114
2015	63	483	11,205	6,200	(258)	17,693
	5,656	(3,523)	22,722	25,336	(7,752)	42,438

25

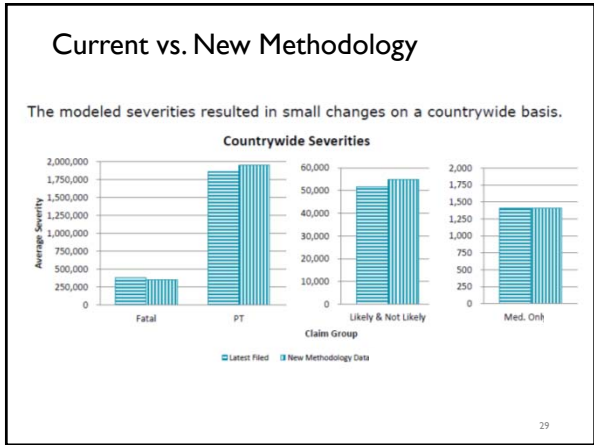
Chart vs. Table Dilemma

<p>Chart</p> <ul style="list-style-type: none"> • Showing lots of data • Showing relationships ✓ Showing trends / patterns ✓ Showing exceptions 	<p>Table</p> <ul style="list-style-type: none"> ✗ Look up individual values ✗ Compare individual values ✗ Precision required • Detail & summary values included • Different magnitudes • Different units of measure
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26







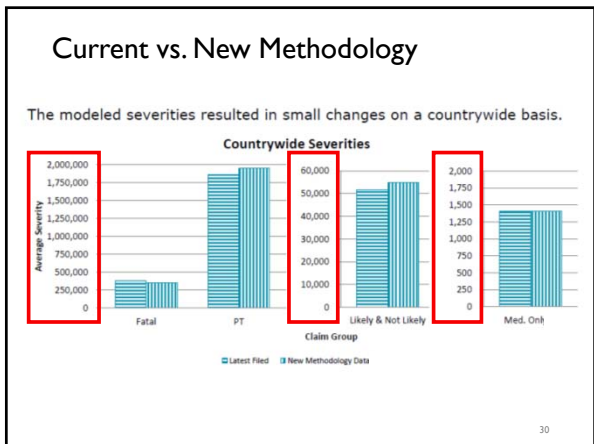


Chart vs. Table Dilemma

Chart

- ✗ Showing lots of data
- ✗ Showing relationships
 - Showing trends / patterns
 - Showing exceptions

Table

- ✓ Look up individual values
- ✓ Compare individual values
 - Precision required
 - Detail & summary values included
- ✓ Different magnitudes
 - Different units of measure

31

Alternative

Small severity changes on a countrywide basis.

Claim Group	Current	New Methodology	% Change
Fatal	265,000	260,000	-1.9%
Permanent Total (PT)	1,850,000	1,900,000	2.7%
Permanent Partial & Temporary Total	52,000	54,000	3.8%
Medical-Only	1,350	1,350	0.0%

32



CAUTION

CAUTION CUIDADO ATTENTION

What is driving reserve results?

33

Original

Large Loss Report - GL - 2016Q1 Change over 2 Qtrs > +/- \$250,000							Loss&ALAE	
Region	Year	Claim Number	Insured Name	Tag Code	Status	Change	ITD	
East	2001	LXE3230	LIBERO MAURIS ASSOC	^	C	-647,064.75	895,716	
	2009	LXR4762	DONEC NON JUSTO LLC	MTN	O	286,316	689,641	
	2010	MLC246	PEDE FOUNDATION	MTN	O	690,530.68	706,136	
	2011	OYQ1108	LUCTUS FELIS CORP	FTL	O	898,315	1,334,796	
	2012	KVR3322	POSUERE INC.	TRD	O	479,913.05	541,444	
	2014	XGK3120	CONSEQUAT ASSOC	BRN	O	-544,617	489,656	
East Total						1,163,393	4,657,389	
West	2003	FBN6235	MAGNA ASSOC	ADV	O	273,089	440,828	
	2006	KIT2562	FRINGILLA INC.	FTL	C	443,350.0	648,087	
	2010	YNG9519	LOGOS SOCIAS INC	^	O	-320,353	371,806	
	2013	PDO1598	CONDIMENTUM CORP	^	O	-351,275.9	400,431	
	2014	VNP7966	VITAE SODALES LLC	FTL	O	439,626	517,355	
West Total						484,437	2,378,507	
Grand Total						1,647,830	7,035,896	

34

Remove colors & fills

Large Loss Report - GL - 2016Q1 Change over 2 Qtrs > +/- \$250,000							Loss&ALAE	
Region	Year	Claim Number	Insured Name	Tag Code	Status	Change	ITD	
East	2001	LXE3230	LIBERO MAURIS ASSOC	^	C	-647,064.75	895,716	
	2009	LXR4762	DONEC NON JUSTO LLC	MTN	O	286,316	689,641	
	2010	MLC246	PEDE FOUNDATION	MTN	O	690,530.68	706,136	
	2011	OYQ1108	LUCTUS FELIS CORP	FTL	O	898,315	1,334,796	
	2012	KVR3322	POSUERE INC.	TRD	O	479,913.05	541,444	
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	2006	KIT2562	FRINGILLA INC.	FTL	C	443,350.0	648,087	
	2010	YNG9519	LOGOS SOCIAS INC	^	O	-320,353	371,806	
	2013	PDO1598	CONDIMENTUM CORP	^	O	-351,275.9	400,431	
	2014	VNP7966	VITAE SODALES LLC	FTL	O	439,626	517,355	
West Total						484,437	2,378,507	
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35

Remove borders & bolding

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000							Loss&ALAE	
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	2009	LXR4762	DONEC NON JUSTO LLC	MTN	O	286,316	689,641	
	2010	MLC246	PEDE FOUNDATION	MTN	O	690,530.68	706,136	
	2011	OYQ1108	LUCTUS FELIS CORP	FTL	O	898,315	1,334,796	
	2012	KVR3322	POSUERE INC.	TRD	O	479,913.05	541,444	
	2014	XGK3120	CONSEQUAT ASSOC	BRN	O	-544,617	489,656	
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	2010	YNG9519	LOGOS SOCIAS INC	^	O	-320,353	371,806	
	2013	PDO1598	CONDIMENTUM CORP	^	O	-351,275.9	400,431	
	2014	VNP7966	VITAE SODALES LLC	FTL	O	439,626	517,355	
West Total						484,437	2,378,507	
Grand Total						1,647,830	7,035,896	

36

Left-align text columns

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim Number	Insured Name	Tag Code	Status	Loss&ALAE	
						Change	ITD
East	2001	LXE3230	Libero Mauris Assoc	^	C	-647,064.75	895,716
	2009	LXR4762	Donec Non Justo LLC	MTN	O	286,316	689,641
	2010	MLC246	Pede Foundation	MTN	O	690,530.68	706,136
	2011	OYQ1108	Luctus Felis Corp	FTL	O	898,315	1,334,796
	2012	KVR3322	Posuere Inc.	TRD	O	479,913.05	541,444
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	2010	YNG9519	Logos Socias Inc	^	O	-320,353	371,806
	2013	PDO1598	Condimentum Corp	^	O	-351,275.9	400,431
	2014	VNP7966	Vitae Sodales LLC	FTL	O	439,626	517,355
West Total						484,437	2,378,507
Grand Total						1,647,830	7,035,896

37

Right-align & round numeric columns

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim Number	Insured Name	Tag Code	Status	Loss&ALAE (\$000)	
						Change	ITD
East	2001	LXE3230	Libero Mauris Assoc	^	C	(647)	896
	2009	LXR4762	Donec Non Justo LLC	MTN	O	286	690
	2010	MLC246	Pede Foundation	MTN	O	691	706
	2011	OYQ1108	Luctus Felis Corp	FTL	O	898	1,335
	2012	KVR3322	Posuere Inc.	TRD	O	480	541
	2014	XGK3120	Consequat Assoc	BRN	O	(545)	490
East Total						1,163	4,657
West	2003	FBN6235	Magna Assoc	ADV	O	273	441
	2006	KIT2562	Fringilla Inc.	FTL	C	443	648
	2010	YNG9519	Logos Socias Inc	^	O	(320)	372
	2013	PDO1598	Condimentum Corp	^	O	(351)	400
	2014	VNP7966	Vitae Sodales LLC	FTL	O	440	517
West Total						484	2,379
Grand Total						1,648	7,036

38

Avoid abbreviations

Large Loss Report **GL** - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim Number	Insured Name	Tag Code	Closed?	Loss&ALAE (\$000)	
						Change	Current
East	2001	LXE3230	Libero Mauris Assoc		Yes	(647)	896
	2009	LXR4762	Donec Non Justo LLC	Mass Tort		286	690
	2010	MLC246	Pede Foundation	Mass Tort		691	706
	2011	OYQ1108	Luctus Felis Corp	Fatality		898	1,335
	2012	KVR3322	Posuere Inc.	Trademark		480	541
	2014	XGK3120	Consequat Assoc	Burns		(545)	490
East Total						1,163	4,657
West	2003	FBN6235	Magna Assoc	Advertising		273	441
	2006	KIT2562	Fringilla Inc.	Fatality	Yes	443	648
	2010	YNG9519	Logos Socias Inc			(320)	372
	2013	PDO1598	Condimentum Corp			(351)	400
	2014	VNP7966	Vitae Sodales LLC	Fatality		440	517
West Total						484	2,379
Grand Total						1,648	7,036

39

Reorder columns

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim		Loss&ALAE (\$000)		Tag Code	Closed?
		Number	Insured Name	Change	Current		
East	2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
	2012	KVR3322	Posuere Inc.	480	541	Trademark	
	2014	XGK3120	Consequat Assoc	(545)	490	Burns	
East Total				1,163	4,657		
West	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
	2010	YNG9519	Logos Socias Inc	(320)	372		
	2013	PDO1598	Condimentum Corp	(351)	400		
	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
West Total				484	2,379		
Grand Total				1,648	7,036		

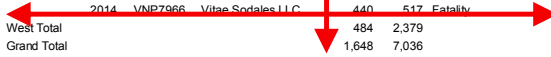


40

Resize columns & rows

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim		Loss&ALAE (\$000)		Tag Code	Closed?
		Number	Insured Name	Change	Current		
East	2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
	2012	KVR3322	Posuere Inc.	480	541	Trademark	
	2014	XGK3120	Consequat Assoc	(545)	490	Burns	
East Total				1,163	4,657		
West	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
	2010	YNG9519	Logos Socias Inc	(320)	372		
	2013	PDO1598	Condimentum Corp	(351)	400		
	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
West Total				484	2,379		
Grand Total				1,648	7,036		



41

Add back (some) emphasis

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim		Loss&ALAE (\$000)		Tag Code	Closed?
		Number	Insured Name	Change	Current		
East	2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
	2012	KVR3322	Posuere Inc.	480	541	Trademark	
	2014	XGK3120	Consequat Assoc	(545)	490	Burns	
	East Total			1,163	4,657		
West	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
	2010	YNG9519	Logos Socias Inc	(320)	372		
	2013	PDO1598	Condimentum Corp	(351)	400		
	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
	West Total			484	2,379		
	Grand Total			1,648	7,036		

42

Highlight with visuals

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim Number	Insured Name	Loss&ALAE (\$000)		Tag Code	Closed?
				Change	Current		
East	2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
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2014	XGK3120	Consequat Assoc	(545)	490	Burns		
East Total				1,163	4,657		
West	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
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	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
West Total				484	2,379		
Grand Total				1,648	7,036		

43

Sort the table

Large Loss Report - GL - 2016 Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim Number	Insured Name	Loss&ALAE (\$000)		Tag Code	Closed?
				Change	Current		
East	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2012	KVR3322	Posuere Inc.	480	541	Trademark	
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2014	XGK3120	Consequat Assoc	(545)	490	Burns	
2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes	
East Total				1,163	4,657		
West	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2010	YNG9519	Logos Socias Inc	(320)	372		
	2013	PDO1598	Condimentum Corp	(351)	400		
West Total				484	2,379		
Grand Total				1,648	7,036		

44

Frame the story

GL results driven by fatalities

Region	Year	Claim Number	Insured Name	Loss&ALAE (\$000)		Tag Code	Closed?
				Change	Current		
East	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2012	KVR3322	Posuere Inc.	480	541	Trademark	
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2014	XGK3120	Consequat Assoc	(545)	490	Burns	
2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes	
East Total				1,163	4,657		
West	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2010	YNG9519	Logos Socias Inc	(320)	372		
	2013	PDO1598	Condimentum Corp	(351)	400		
West Total				484	2,379		
Grand Total				1,648	7,036		

Large Loss Report - GL - 2014 Q3 Change over 2 Qtrs > +/- \$250,000

45

Before

Large Loss Report - GL - 2016Q1 Change over 2 Qtrs > +/- \$250,000

Region	Year	Claim Number	Insured Name	Tag Code	Status	Loss&ALAE	
						Change	ITD
East	2001	UXE3230	LIBERO MAURIS ASSOC	^	C	-647,064.75	895,716
	2009	LXR4762	DONEC NON JUSTO LLC	MTN	O	286,316	689,641
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	2006	KIT2562	FRINGILLA INC.	FTL	C	443,350.0	648,087
	2010	YNG9519	LOGOS SOCIAS INC	^	O	-320,353	371,806
	2013	PDO1598	CONDIMENTUM CORP	^	O	-351,275.9	400,431
	2014	VNP7966	VITAE SODALES LLC	FTL	O	439,626	517,355
West Total						484,437	2,378,507
Grand Total						1,647,830	7,035,896

Confidential & Proprietary, Not for Distribution

46

After

GL results driven by fatalities

Region	Year	Claim Number	Insured Name	Loss&ALAE (\$000)		Tag Code	Closed?
				Change	ITD		
East	2011	OYQ1108	Luctus Felis Corp	898	1,335	Fatality	
	2010	MLC246	Pede Foundation	691	706	Mass Tort	
	2012	KVR3322	Posuere Inc.	480	541	Trademark	
	2009	LXR4762	Donec Non Justo LLC	286	690	Mass Tort	
	2014	XGK3120	Consequat Assoc	(545)	490	Burns	
	2001	UXE3230	Libero Mauris Assoc	(647)	896		Yes
	East Total				1,163	4,657	
West	2006	KIT2562	Fringilla Inc.	443	648	Fatality	Yes
	2014	VNP7966	Vitae Sodales LLC	440	517	Fatality	
	2003	FBN6235	Magna Assoc	273	441	Advertising	
	2010	YNG9519	Logos Socias Inc	(320)	372		
	2013	PDO1598	Condimentum Corp	(351)	400		
West Total				484	2,379		
Grand Total				1,648	7,036		

Large Loss Report - GL - 2014 Q3 Change over 2 Qtrs > +/- \$250,000

47

Quantitative

- Numeric
- Continuous / Countable
- Measureable
- Perform calculations on

Examples:

- Premium
- Claim Counts
- Claim Severity
- Payroll

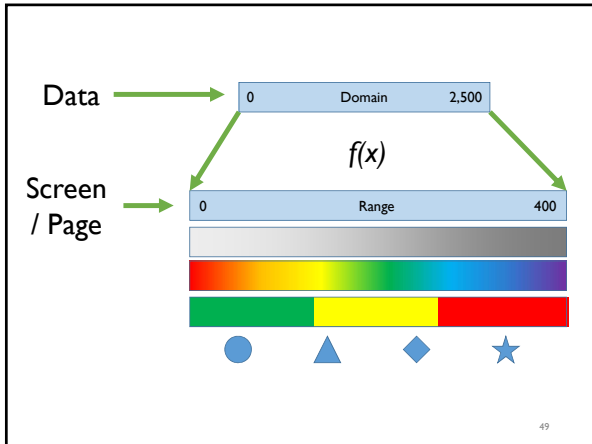
Categorical

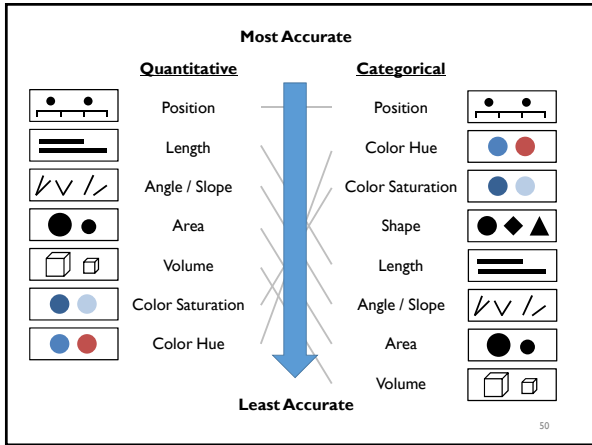
- Alpha-numeric
- Fully Discrete
- Descriptive

Examples:

- Nominal (Auto, GL, Prop, WC)
- Ordinal (Hazard Groups A-G)
- Interval (Claim size <\$100K, \$100K-\$250K, etc.)
- Hierarchical (Region / Office)

48

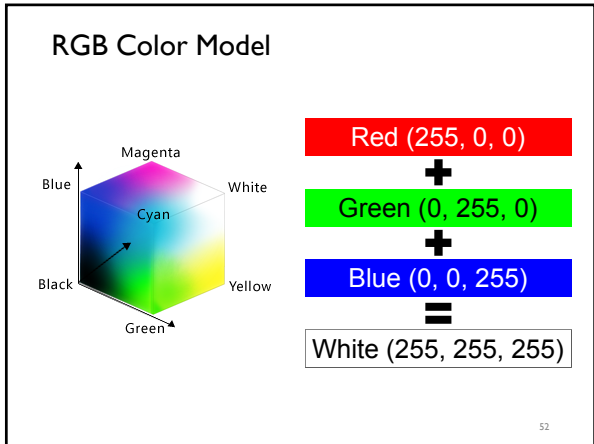


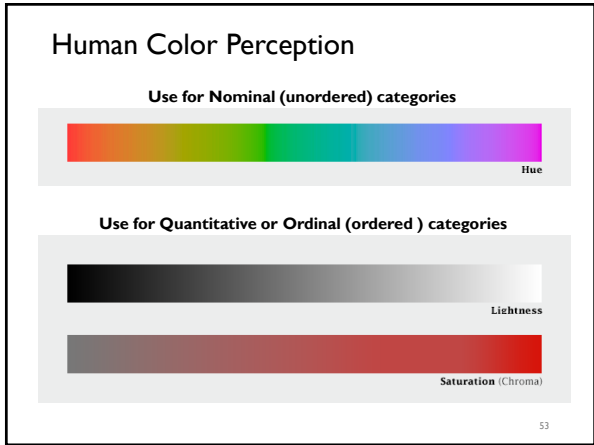


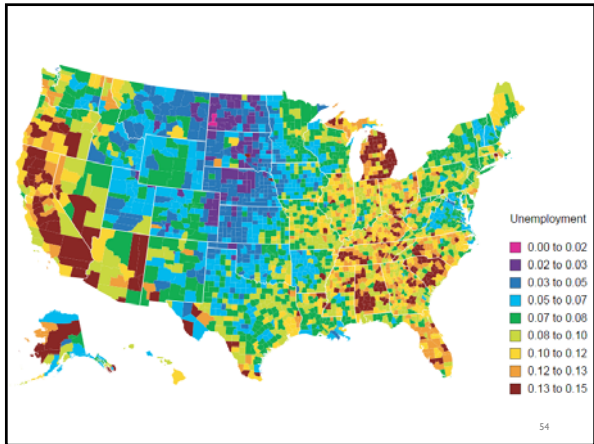
Three Problems in Color Perception

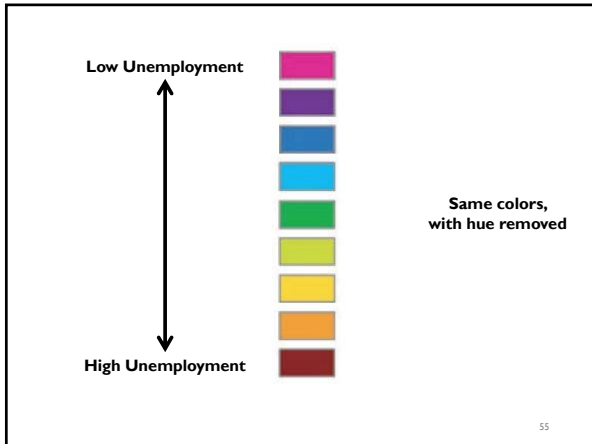
- Computer Colors vs. Human Vision
- Perceived Lightness
- Color Vision Deficiency (Color-blindness)

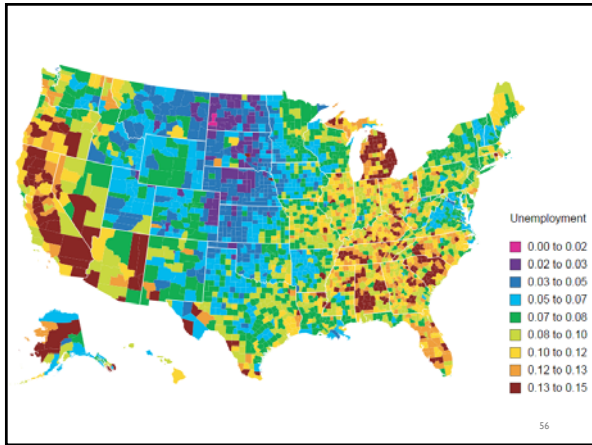
The number 51 is in the bottom right corner.

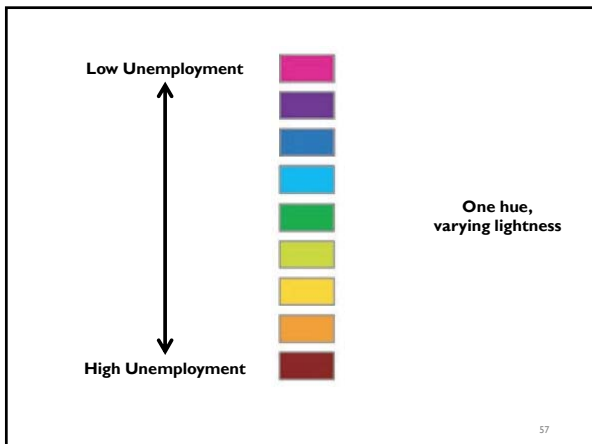


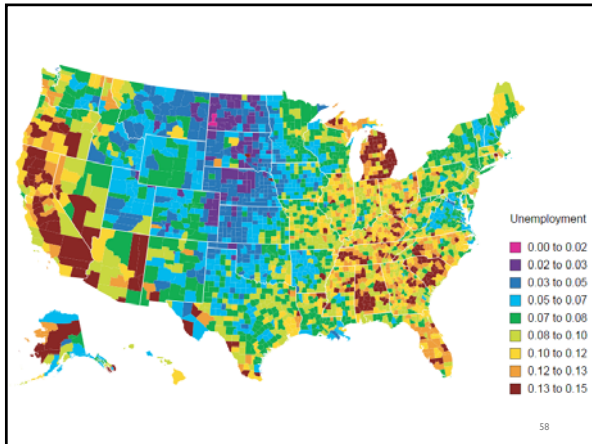


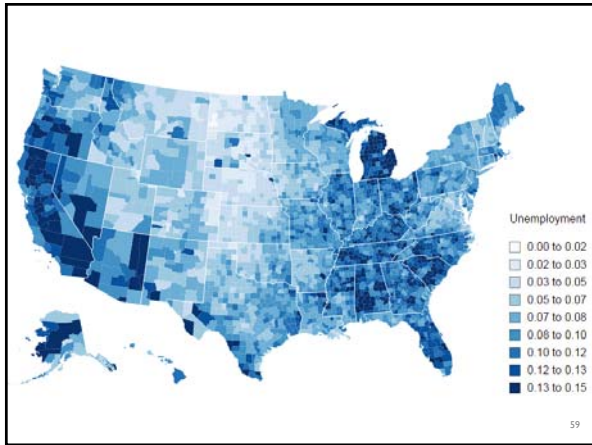


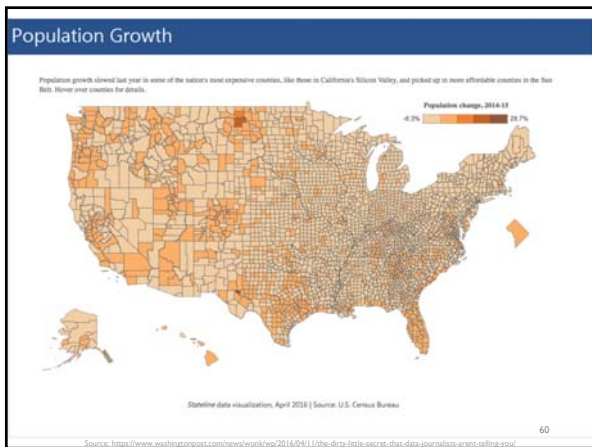


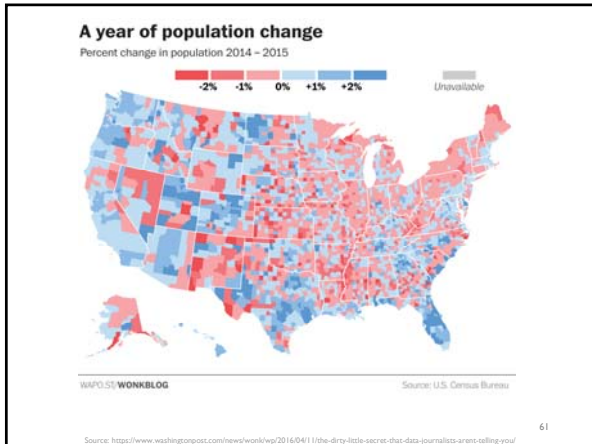




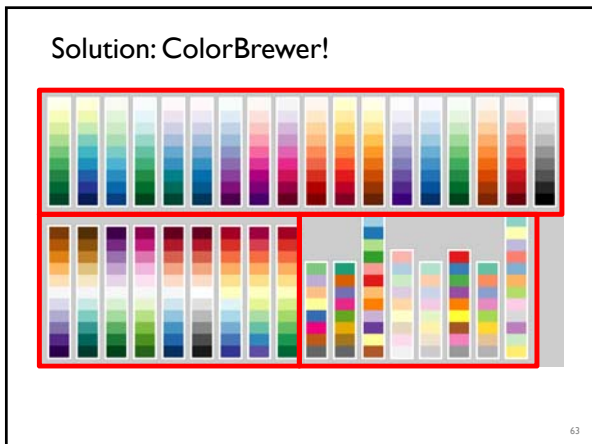


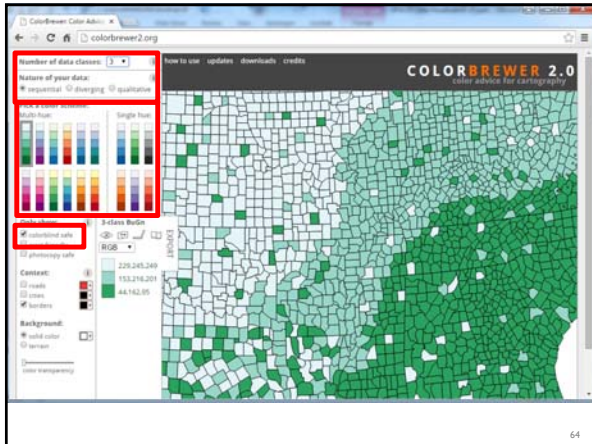


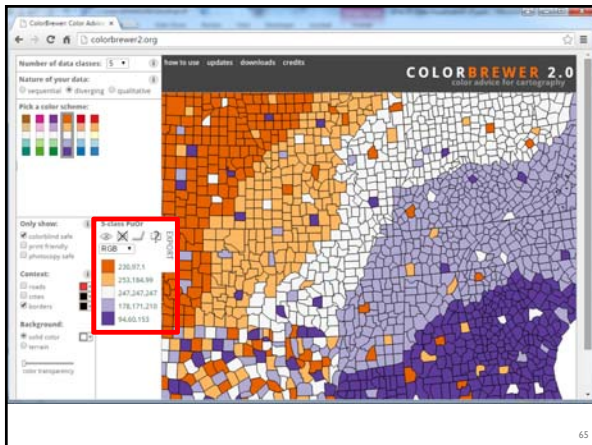


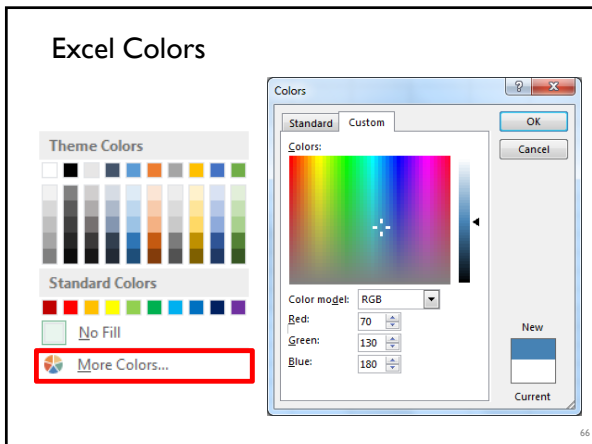












Excel Colors

Nominal

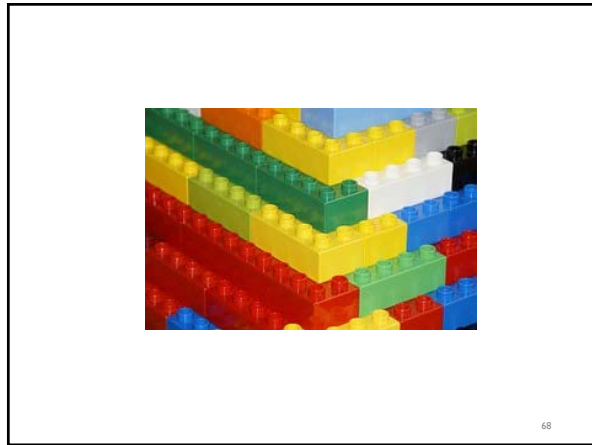
Theme Colors

Standard Colors

No Fill

More Colors...

67



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EDWARD R. TUFT

Second Edition
Show Me the Numbers
Designing Tables and Graphs to Engage
Stephen Few

69
